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(54) **A POWER DRILL CHUCK**

(57) The present invention relates to a power drill chuck, which includes a drill body, a nut, jaws, a front sleeve, a rear sleeve, a nut sleeve, a rolling body. Said three jaws are mounted in three inclined holes, which are trisection of said drill body. The nut thread constitutes the thread drive together with the thread of said jaws mounted in said three inclined holes of said drill body. Said front sleeve is connected with said drill body, and said nut sleeve fixed by connection with said nut extends backwards, whose rear end portion a plurality of projecting keys are provided in. Said rear sleeve is mounted around the rear of said nut sleeve and may rotate relative to said nut sleeve and drill body. There provided some piecewise annular holes in rear end face of said rear sleeve and a plurality of keys on the inner end face. A positioning sleeve fixed by connection with the rear portion of said drill body may position axially the said rear sleeve on the drill body. A plurality of elastic impact members is mounted between said nut sleeve and said rear sleeve. Said elastic impact members are provided with a plurality of deformation portions and a plurality of projecting keys. A location ring in accordance with the present invention is provided in the rear sleeve and rear portion of said drill body. There are some connection keys and connection holes on the location ring. According to the present invention, the art scheme is suitable for all kinds of clamping of drilling tool, which has a powered clamping function, so as to improve the gripping power for handle of the tool. (Fig. 1)

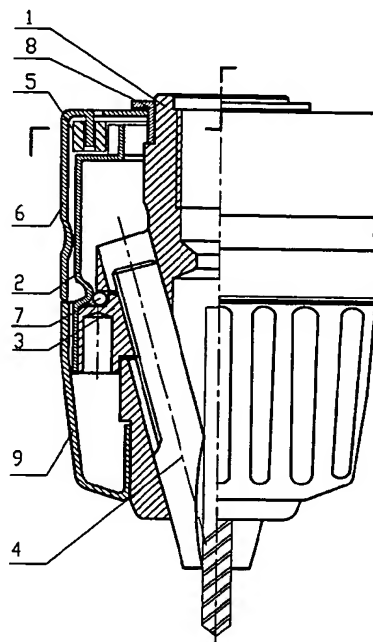


Fig. 1

## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to a clamping device for drilling tools, and particularly to a power drill chuck.

### BACKGROUND ART

**[0002]** As we know, a manually tightened drill chuck in the present art generally includes a drill body, jaws, a nut, a nut sleeve, a bearing, a front sleeve, and a rear sleeve. The three jaws are mounted respectively in three inclined holes that are trisection of said drill body. The nut is mounted in a nut slot of the drill body. The nut thread constitutes a thread drive mechanism together with the thread of the jaws. The nut sleeve is fixedly connected with the nut. Between the front sleeve and the nut or the nut sleeve a key type connection is adopted. The rear sleeve is fixedly connected with the drill body that is provided with a threaded hole or a tapered hole on its rear portion. During using after being mounted, the drill body is connected with a drive shaft screw of power machine by the threaded hole at its rear portion. The drive shaft drives the drill body and thereby brings the three jaws and the tool being clamped to rotate synchronously. While mounting and clamping the tool, the front sleeve and the rear sleeve are grasped by hands and are rotated from each other so that the nut connected with the front sleeve rotates relative to the jaws in the drill body. Through the thread drive between the nut and the jaws, the jaws are moved forwards along the inclined holes of the drill body to clamp the tool handle. While expecting to clamp the tool handle more firmly, one should exert strength to rotate the front and rear sleeve much by hands. As the twisting force from hands is limited, the clamping force acted on the tool handle generated from the drill chuck by manually rotating is at a lower level. Thus the clamped tool tends to get loosen when the working resistance is larger. The patent US005988653A disclosed a clamping device that clamps the tool handle in virtue of the power of the electric tool. However, the structure of the device is much complex.

### SUMMARY OF THE INVENTION

**[0003]** Accordingly, the technical object of the present invention is to provide a power drill chuck that has simple structures and is convenient to use, and through which a power tightened clamp can be obtained and the clamp is secure.

**[0004]** To achieve the above-mentioned object, the present invention provides a power drill chuck including a drill body, a nut, jaws, a front sleeve, a rear sleeve, a nut sleeve, and a rolling body, wherein the three jaws are mounted respectively in three inclined holes which

are trisection of the drill body, the nut thread constitutes a thread drive mechanism together with the thread of the jaws mounted in the three inclined holes of the drill body, the front sleeve is fixedly connected with the drill body, which is characterized in that the nut sleeve is fixedly connected with the nut and extends backwards, in the rear end of which a plurality of projecting key are provided, the rear sleeve is mounted around the rear portion of the nut sleeve and can be rotated with respect to the nut sleeve and the drill body, there are some piecewise annular holes provided on the rear end surface of the rear sleeve and a plurality of keys on the inner end surface, a positioning sleeve is fixedly connected with the rear portion of the drill body to limit axially the position of the rear sleeve on the drill body, a plurality of elastic impact members are mounted between the nut sleeve and the rear sleeve, the elastic impact members are provided with a plurality of elastic deformation portions which are capable of elastic deformation and a plurality of projecting keys.

**[0005]** In the power drill chuck according to the present invention, there is a location ring provided in the rear sleeve and the rear portion of the drill body, the location ring is provided with a plurality of connecting keys and connecting holes. There is an anti-friction ring or bearing provided between an exterior wall of the nut sleeve and an inner wall of the rear sleeve.

**[0006]** With the above-mentioned structures according to the present invention, the drill body of the drill chuck is connected with the drive shaft of the electric drill and can rotate synchronously with it. While using, the drive shaft drives the drill body and the jaws to rotate; the rear sleeve is gripped with hands to keep immovable. A location ring can also be mounted between the rear sleeve and the front end of the electric drill to locate and fixed at the front end of the electric drill. The location ring is provided with keys that restrict the rear sleeve to rotate relative to the location ring only in a certain angle and not to rotate at both extreme position of the angle. In the drill chuck, the nut and the nut sleeve are fixedly connected, the slopes of the projecting keys at the rear end of the nut sleeve and the slopes of the projecting keys of the elastic impact member get in contact with each other, and the elastic impact member is connected to the rear sleeve, thereby the nut are prevented from rotating so that a relative rotation occurs between the jaws and the nut. Through the thread drive of the nut and the jaws, the jaws are closed until the jaws contact the tool handle to be clamped. After the jaws have contacted and clamped the tool handle, the resistance to the thread drive of the nut and the jaws increases rapidly, and the slopes of the projecting keys at the rear end of the nut sleeve and the slopes of the projecting keys of the elastic impact member are pressed against each other, so that the elastic impact member is forced to overcome the resilience of the elastic deformation portion and moves along the slopes of the projecting keys until the tops of the both projecting keys are in contact,

and subsequently, the tops of the both projecting keys slide relatively and run out of in contact, in this manner, the nut and the jaws are rotated synchronously. Being driven by the rotating torque of the drive shaft of the electric hand drill, the drill body, the jaws, the nut, and the nut sleeve rotate synchronously together with the drive shaft of the electric hand drill, and at the same time, the elastic impact member returns reversely to its original position again owing to the elasticity of the elastic deformation portion, such that while moving, the slopes of the projecting keys of the nut sleeve come into impact with the slopes of the projecting key of the elastic impact member. Under the effect of impact a slight relative rotation occurs between the nut and the jaws so that the jaws can clamp the tool handle more firmly. The elastic impact member is forced to overcome the resilience of the elastic deformation portion such that the both projecting keys are out of contact again due to the impact force between the slopes of the both projecting keys. The drive shaft of the electric hand drill rotates continuously, the impact course is repeated continuously, and thereby the tool handle is clamped firmly by the jaws. When expecting to loosen the tool, the drive shaft of the electric hand drill are driven to rotate reversely, the slopes of the projecting keys of the nut sleeve and the slopes of the projecting keys of the elastic impact member impact and disengage from each other repeatedly in reverse direction until the threads of the nut and the jaws move relatively to loosen the tool handle being clamped. An anti friction ring or a bearing may be mounted between the stationary rear sleeve and the rotational nut sleeve to keep the nut sleeve to rotate agilely along with the drill body. Comparing with the prior art, the drill chuck according to the present invention has a powered clamping function, such that the gripping power for handle of the tool is improved to ensure the clamp secure. The present invention is suitable for all kinds of clamping of drilling tool.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0007]** Now the present invention will be described more detail in conjunction with the accompanying drawing, in which:

- Fig. 1 is a structure schematic view of a power drill chuck, i.e., an elevation sectional view according to the first embodiment of the present invention;
- Fig. 2 is a top sectional view according to the first embodiment of the present invention;
- Fig. 3 is a structure exploded view according to the first embodiment of the present invention;
- Fig. 4 is an elevation sectional view according to the second embodiment of the present invention;

- Fig. 5 is a top sectional view according to the second embodiment of the present invention;
- Fig. 6 is a structure exploded view according to the second embodiment of the present invention;
- Fig. 7 is an elevation sectional view according to the third embodiment of the present invention;
- Fig. 8 is a structure exploded view according to the third embodiment of the present invention;
- Fig. 9 is an elevation sectional view according to the fourth embodiment of the present invention;
- Fig. 10 is a structure schematic view of the elastic impact member according to the fourth embodiment of the present invention;
- Fig. 11 is a structure exploded view according to the fourth embodiment of the present invention;
- Fig. 12 is an elevation sectional view according to the fifth embodiment of the present invention; and
- Fig. 13 is a top view of Fig. 12 of the present invention.

**[0008]** The same reference numbers are used to indicate the same or similar parts in the accompanying drawings according to the present invention.

#### DESCRIPTION OF PREFERRED EMBODIMENTS

**[0009]** The first embodiment: As shown in Figs. 1, 2, and 3, a power drill chuck is illustrated which includes a drill body **1**, a nut sleeve **2**, a nut **3**, jaws **4**, an elastic impact member **5**, a rear sleeve **6**, a rolling body **7**, a positioning sleeve **8**, and a front sleeve **9**. The three jaws **4** are mounted respectively in three inclined holes which are trisection of the drill body. The thread of the nut **3** constitutes a thread drive together with the thread of the jaws **4** mounted in the three inclined holes of the drill body. The front sleeve **9** is fixedly connected to the drill body **1**. The nut sleeve **2** is fixedly connected to the nut **3** and extends backwards, in its rear end a plurality of projecting keys **2-1** are provided. The rear sleeve **6** is mounted around the rear portion of the nut sleeve **2** and can rotate relative to the nut sleeve and the drill body. There are some piecewise annular holes **6-2** provided on the rear end surface of the rear sleeve **6** and a plurality of keys **6-1** on the inner end surface. The positioning sleeve **8** is fixedly connected to the rear portion of the drill body **1** so as to position the rear sleeve axially on the drill body. A plurality of elastic impact members **5** is mounted between the nut sleeve and the rear sleeve. The elastic impact members are provided with

a plurality of deformation portions **5-3** and a plurality of projecting keys **5-2**.

**[0010]** While using, the power drill chuck is connected to the screw of the drive shaft of an electric portable drill through a thread hole in the rear portion of the drill chuck. The positioning sleeve **8** is fixedly connected to the rear portion **1-1** of the drill chuck **1** so as to position the rear sleeve **6** axially on the drill body **1**. The rear sleeve can rotate with respect to the drill body **1** and the positioning sleeve **8**. On the inner end face of the rear sleeve **6** there are provided with a plurality of keys **6-1** to which the elastic impact members **5** are mounted by fitting parts **5-1** thereof. The elastic impact members **5** are provided with a plurality of deformation portions **5-3** and a plurality of projecting keys **5-2**. Both sides of the projecting key **5-2** in the directions along the circumference are slopes. The nut sleeve **2** is fixedly connected to the nut **3** and extends backwards, in rear end of which a plurality of projecting keys **2-1** are provided. Both sides of the projecting key **2-1** in the directions along the circumference are slopes. The nut sleeve **2** is also provided with an annular rib **2-2** projecting inwards for restricting the rolling bodies **7** assembled in the nut. When the power of the electric drill is switched on, the drive shaft of the electric drill drives in turn the drill body **1**, the front sleeve **9**, the positioning sleeve **8**, and the jaws **4** to rotate.

**[0011]** While the rear sleeve **6** is out of the restriction of the resistance, the slopes of the projecting keys **5-2** of the elastic impact member **5** contacts the slopes of the projecting keys **2-1** of the nut sleeve **2** such that the rear sleeve rotates along with the nut sleeve **2**. When a tool is required to be clamped, one may grasps the rear sleeve **6** slightly and keeps the same to be immovable such that the elastic impact member **5**, the nut sleeve **2** and the nut **3** are immovable while the drill body **1** and the jaws **4** rotate along with the drive shaft of the electric drill. In this case, a relative rotation occurs between the jaws **4** and the nut **3**, thereby, the jaws **4** move forwards along the inclined holes **1-2** in the drill body **1** so as to clamp the tool handle **104** in virtue of the thread drive. As the drill body **1** and jaws **4** continue to rotate along with the drive shaft of the electric drill, the pressure applied to the slopes of the projecting keys **5-2** of the elastic impact member by the slopes of the projecting keys **2-1** of the nut sleeve increases rapidly, so that the elastic impact member **5** is forced to be deformed elastically and retracts relative to the projecting keys **2-1** of the nut sleeve. The projecting keys **2-1** of the nut sleeve and the projecting keys **5-2** of the elastic impact member slide relatively and run out of contact, and then the elastic impact member **5** returns to its original position again by its inherent elasticity. The nut sleeve **2** and the nut **3** rotate along with the jaws **4** and the drill body **1** so that the projecting keys **2-1** of the nut sleeve impact the projecting keys **5-2** of the elastic impact member. Under the effect of impacting force the nut sleeve **2** brings the nut **3** to get a slight relative rotation relative to the jaws **4** so

that the clamping force to the tool handle **104** by the jaws **4** increases, and the impacting force obliges the projecting keys of the elastic impact member to retract again. Such impact is repeated and continues until the tool handle **104** is clamped firmly by the jaws **4**. Then the grasp to the rear sleeve **6** can be released and the rear sleeve will rotate along with the drill body such that the machining works can be done.

**[0012]** When expecting to loosen the clamped tool **104**, the drive shaft of the electric hand drill are required to be rotated reversely, and drive the drill body **1**, the front sleeve **9**, jaws **4**, the nut **3**, and the nut sleeve **2** to rotate reversely together. The rear sleeve **6** is grasped slightly by hand so that reverse impact repeatedly occurs between the projecting keys **2-1** of the nut sleeve and the projecting keys **5-2** of the elastic impact member. Under such repeated impact, the nut sleeve **2** brings the nut **3** to get a relative rotation relative to the jaws **4** to loosen the tool **104**.

**[0013]** The second embodiment: As shown in Figs. 4, 5, and 6, a power drill chuck is illustrated which includes a drill body **1**, a nut sleeve **2**, a nut **3**, jaws **4**, an elastic impact member **55**, a rear sleeve **6**, a rolling body **7**, a positioning sleeve **8**, and a front sleeve **9**. Wherein the elastic impact member **55** is dishshaped and provided with a plurality of deformation portions **55-2** and a plurality of down-projected projecting keys **55-1**. The nut sleeve **2** is provided with upper-projected projecting keys **2-1**. Both sides of the down-projected projecting keys **55-1** of the elastic impact member and the upper-projected projecting keys **2-1** of the nut sleeve **2** in the directions along the circumferences thereof are slopes. The elastic impact member **55** is mounted on the projecting keys **6-1** of the rear sleeve through slots **55-3** such that the elastic impact member **55** may slide up and down along the projecting keys **6-1** of the rear sleeve under the effect of the elastic deformation portion **55-2**. The slopes of the projecting keys **55-1** of the elastic impact member **55** contact the slopes of projecting keys **2-1** of the nut sleeve **2**.

**[0014]** When a tool requires to be clamped, one may grasps the rear sleeve **6** slightly and keeps the same to be immovable such that the nut sleeve **2** and the nut **3** are immovable together with the elastic impact member **55** and the rear sleeve **6** under the resistance of the projecting keys **2-1**. At this time, a relative rotation occurs between the jaws **4** and the nut **3**, thereby, the jaws **4** move forwards along the inclined holes **1-2** in the drill body **1** so as to clamp the tool handle **104** in virtue of the thread drive. As the drill body **1** and jaws **4** continue to rotate along with the drive shaft of the electric drill, the resistance for relatively rotating between the jaws **4** and the nut **3** and the press imposed on the slopes of the projecting keys **55-1** of the elastic impact member by the slopes of the projecting keys **2-1** of the nut sleeve increases rapidly, so that the elastic impact member **55** is forced to be deformed elastically at the elastic deformation portions **55-2** thereof and retracts backwards.

The projecting keys **2-1** of the nut sleeve and the projecting keys **55-1** of the elastic impact member slide relatively and run out of contact, and then the elastic impact member **55** returns to its original position again by the elasticity of the elastic deformation portion **55-2**. The nut sleeve **2** and the nut **3** continue to rotate along with the jaws **4** and the drill body **1** so that the projecting keys **2-1** of the nut sleeve impact the projecting keys **55-1** of the elastic impact member. Under the effect of impact the nut sleeve **2** brings the nut **3** and makes the same having a slight relative rotation relative to the jaws **4** and the clamping force to the tool handle **104** by the jaws **4** increases. The impacting force depresses the projecting keys of the elastic impact member to retract again. Such impact is repeated and continues until the tool handle **104** is clamped firmly by the jaws **4**. Then the grasp to the rear sleeve **6** can be relapsed and the rear sleeve will rotate along with the drill body such that the machining works can be done.

**[0015]** When expecting to loose the clamped tool **104**, the drive shaft of the electric hand drill is required to be rotated reversely, and drive the drill body **1**, the front sleeve **9**, jaws **4**, the nut **3**, and the nut sleeve **2** to rotate reversely together. The rear sleeve **6** is grasped slightly by hand so that reverse impact repeatedly occurs between the projecting keys **2-1** of the nut sleeve and the projecting keys **5-1** of the elastic impact member. Under such repeated impact, the nut sleeve **2** brings the nut **3** and makes the same having a relative movement relative to the jaws **4** to loosen the tool **104**.

**[0016]** The third embodiment: The power drill chuck of the present invention may further include a location ring **10** at the rear sides of the rear sleeve **6** and the drill body **1**. The location ring is provided with a plurality of connection keys and connection holes. As shown in Figs. 7 and 8, there illustrated is the power drill chuck which includes a drill body **1**, a nut sleeve **2**, a nut **3**, jaws **4**, an elastic impact member **5**, a rear sleeve **6**, rolling bodies **7**, a positioning sleeve **8**, a front sleeve **9**, a location ring **10**, and a bearing **12**. While mounting the drill chuck to a electric hand drill, firstly the location ring **10** is fixed to a annular member **101** provided in the shield cup **103** of the electric hand drill through screws **102** with the connection keys **10-1** of the location ring **10** being inserted in the annular holes **6-2** of the rear sleeve **6**. Then the thread hole in the rear portion of the drill chuck is engaged with the screw of the drive shaft of the electric hand drill. The rear sleeve is rotated in normal direction such that the reversed side walls of the annular holes **6-2** of the rear sleeve contact the keys **10-1** of the location ring. The elastic impact member **5** is mounted on the projecting keys **6-1** of the rear sleeve through a fitting portion **5-1** such that the slopes of the projecting keys **5-2** of the elastic impact member **5** contact the slopes of the projecting keys **2-1** of the nut sleeve. Since the rear sleeve **6** is resisted by the connection keys **10-1** of the location ring and cannot move in normal direction, the nut sleeve **2** and the nut **3** cannot

rotate in normal direction too as the contact of the projecting keys **5-2** of the elastic impact member and the projecting keys **2-1** of the nut sleeve.

**[0017]** The switch of the electric hand drill is closed so that the drive shaft of the electric hand drill brings the drill body **1**, the jaws **4** and the front sleeve **9** to rotate together. The threads of the jaws **4** and the threads of the nut **3** form a thread drive, thereby, the jaws **4** move forwards along the inclined holes in the drill body **1** until the tool handle **104** is clamped. As the drill body **1** and jaws **4** continue to rotate along with the drive shaft of the electric hand drill, the press imposed on the slopes of the projecting keys **5-2** of the elastic impact member by the slopes of the projecting keys **2-1** of the nut sleeve increases rapidly so that the elastic impact member **5** is forced to be deformed elastically and retracts backwards relative to the projecting keys **2-1** of the nut sleeve to rotate the nut sleeve **2** and the nut **3** together with the jaws **4** and the drill body **1**. After the projecting keys **2-1** of the nut sleeve travels over the projecting keys **5-2** of the elastic impact member, the projecting keys **5-2** of the elastic impact member **5** returns to its original position again by the elastic resilience. The nut sleeve **2** continues to rotate so that the projecting keys **2-1** impact the projecting keys **5-2** of the elastic impact member. The impact force generates a slight relative movement between the nut **3** and the jaws **4** and increases the clamping force to the tool handle **104** by the jaws **4**. The impact force oppresses the projecting keys of the elastic impact member to retract again, such impact is repeated and continues until the tool handle **104** is clamped firmly by the jaws **4**.

**[0018]** What is described in the above is the course that the tool is clamped. When expecting to start a machining work, one should rotate the rear sleeve **6** reversely such that the connection keys **10-1** presses the elastic impact member **5** to deform, and presses against the projecting keys **5-2** to ensure the projecting keys **5-2** not contacting with the projecting keys **2-1** of the nut sleeve. In this state, the nut sleeve **2** and the nut **3** can rotate along with the drill body **1** and the jaws **4** without hindrance. Between the nut sleeve **2** and the rear sleeve **6** a bearing **12** is mounted to ensure that the nut sleeve **2** can rotate agilely at high speed.

**[0019]** When expecting to loosen the clamped tool, one should further rotate reversely the rear sleeve such that the normal-direction side walls of the annular holes **6-2** of the rear sleeve contact the connection keys **10-1** of the location ring. In this state, the pressure applied to the projecting keys **5-2** of the elastic impact member by the connection keys **10-1** is released and the elastic impact member **5** returns to its original position. The drive shaft of the electric hand drill is rotated reversely to drive the drill body **1**, the front sleeve **9**, jaws **4**, the nut **3**, and the nut sleeve **2** to rotate reversely together. An impact repeatedly occurs between the projecting keys **2-1** of the nut sleeve and the projecting keys **5-2** of the elastic impact member. Under such repeated impact, the nut

sleeve 2 brings the nut 3 and makes the same having a relative rotation relative to the jaws 4 to ease the tool 104 off.

[0020] The fourth embodiment: As shown in Figs. 9 and 11, the illustrated is another power drill chuck in which the constituting structure is substantially the same as that of the third embodiment, and no descriptions will be made any more for the same parts. The projecting keys 55-1 and the elastic deformation portions 55-2 of the elastic impact member 55 take an end face-arranged structure. The projecting keys 55-1 are down-projected, as shown in Fig. 10. At the same time the elastic impact member 55 is provided with cam curved surfaces 55-3 and 55-4 that is changed in the direction of the axis. Under the resilience of the elastic deformation portions 55-2, the cam-curved surfaces 55-3 or 55-4 keeps in contact with the pawls 6-3 of the rear sleeve keys 6-1 all along. The projecting keys 2-1 of the nut sleeves 2 are also an end face-arranged structure and are upper-projected. Rolling bodies 13 are mounted between the nut sleeve 2 and the rear sleeve 6.

[0021] While the rear sleeve 6 is rotated in normal direction, the pawl 6-3 of the rear sleeve keys 6-1 is located at position of the cam-curved surfaces 55-3. The resilience of the elastic deformation portion 55-2 moves the elastic impact member 55 forwardly to contact the nut sleeve 2. After the tool handle has been clamped, when the nut sleeve 2, together with the nut 3, the drill body 1 and the jaws 4, rotate along with the drive shaft of the electric hand drill, impact occurs between the slopes of the projecting keys 2-1 of the nut sleeve and the slopes of the projecting keys 55-1 of the elastic impact member so that the nut 3 fixedly connected with the nut sleeve 2 generates a slight relative rotation relative to the jaws 4, thus the jaws can clamp the tool more tightly.

[0022] When expecting to remove the tool, the drive shaft of the electric hand drill is required to be rotated reversely. The projecting keys 2-1 of the nut sleeve impact the projecting keys 55-1 of the elastic impact member, and thereby, the nut 3 generates a reverse relative rotation relative to the jaws 4 to loosen the tool. When the tool has been clamped and the machining work will start, one should rotate the rear sleeve 6 reversely to position the pawls 6-3 of the rear sleeve keys at the position of the cam curved surfaces 55-4 of the elastic impact member, and thereby the projecting keys 55-1 of the elastic impact member may be out of contact with the projecting keys 2-1 of the nut sleeve 2 completely, such that the nut sleeve 2 and the nut 3 rotate along with the drill body 1 and the jaws 4 without hindrance. The principle of operation of this embodiment is the same as that of the third embodiment.

[0023] The fifth embodiment: As shown in Figs. 12 and 13, the illustrated is a power drill chuck which includes a drill body 1, a nut sleeve 2, a nut 3, jaws 4, rolling bodies 7, and a front sleeve 9. The projecting keys 2-3 provided at the rear end face of the nut sleeve

2 can impact the impact projecting keys specially-designed in the electric hand drill so as to clamp the tool.

## 5 Claims

1. A power drill chuck comprising a drill body, a nut, jaws, a front sleeve, a rear sleeve, a nut sleeve, a rolling body, wherein the three jaws are mounted respectively in three inclined holes which are trisection of the drill body, the nut thread constitutes a thread drive together with the thread of the jaws mounted in the three inclined holes of the drill body, the front sleeve is fixedly connected with the drill body, what is **characterized in that** the nut sleeve is fixedly connected to the nut and extends backwards, in a rear end of which a plurality of projecting keys are provided, the rear sleeve is mounted around the rear portion of the nut sleeve and may rotate relative to the nut sleeve and the drill body, the rear sleeve is provided with piecewise annular holes on its rear end surface and a plurality of keys on its inner end surface, a positioning sleeve is fixedly connected to the rear portion of the drill body to position axially the rear sleeve on the drill body, a plurality of elastic impact members are mounted between the nut sleeve and the rear sleeve, the elastic impact members are provided with a plurality of elastic deformation portions and a plurality of projecting keys.
2. The power drill chuck as described in claim 1, wherein there is a location ring provided at the rear sides of the rear sleeve and the drill body, the location ring is provided with a plurality of connecting keys and connecting holes.
3. The power drill chuck as described in claim 2, wherein there is an anti-friction ring or bearing provided between an exterior wall of the nut sleeve and an inner wall of the rear sleeve.
4. The power drill chuck as described in claim 1 or 2, wherein both side surfaces of the projecting keys at the rear end of the nut sleeve in the direction of circumference are slopes.
5. The power drill chuck as described in claim 1 or 2, wherein the elastic impact member is mounted on the keys of the rear sleeve.
6. The power drill chuck as described in claim 1 or 2, wherein both side surfaces of the projecting keys of the elastic impact member in the direction of circumference are slopes.
7. The power drill chuck as described in claim 1 or 2, wherein the elastic impact member is provided with

cam curved surfaces changed in the direction of the axis of the drill chuck.

8. The power drill chuck as described in claim 1 or 2, wherein the elastic deformation portions of the elastic impact member are separate elastic deforming elements apart from the elastic impact member. 5
9. The power drill chuck as described in claim 1 or 2, wherein the keys at the inner end face of the rear sleeve is provided with pawls. 10

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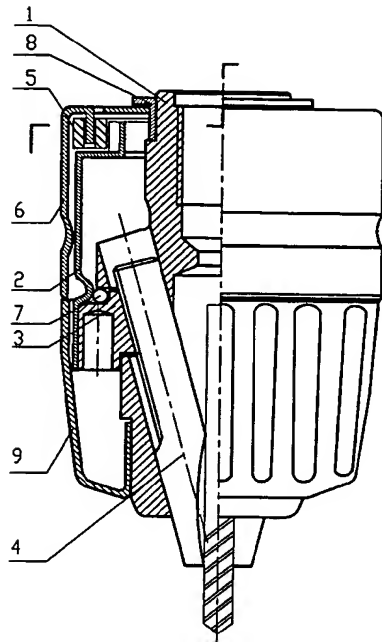


Fig. 1

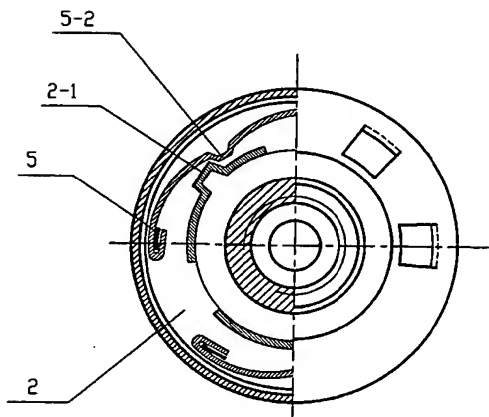


Fig. 2

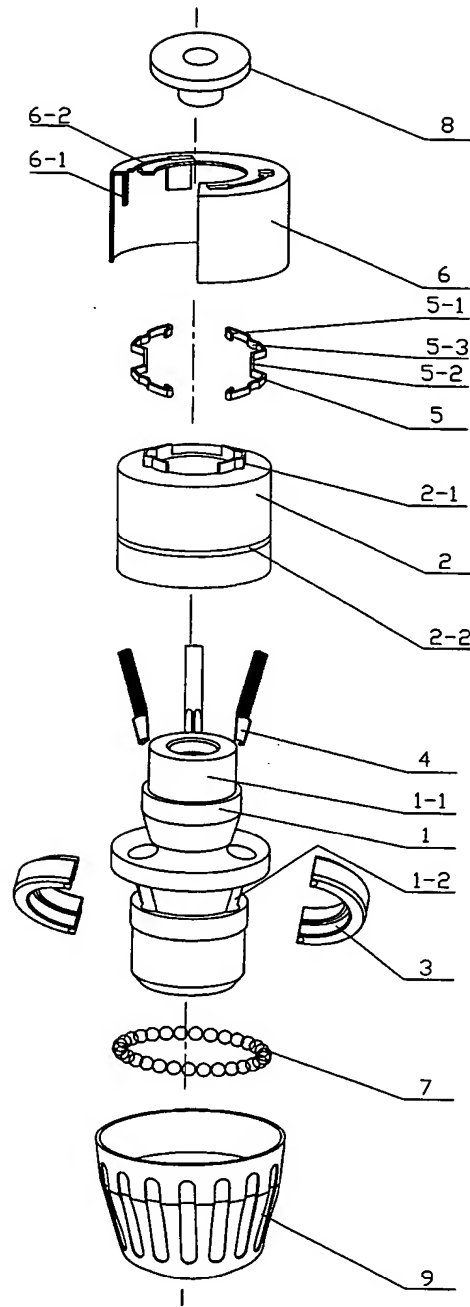


Fig. 3



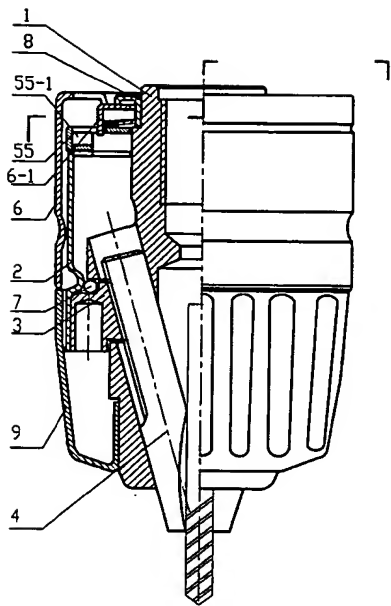


Fig. 4

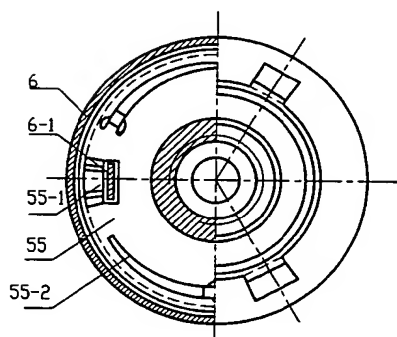


Fig. 5

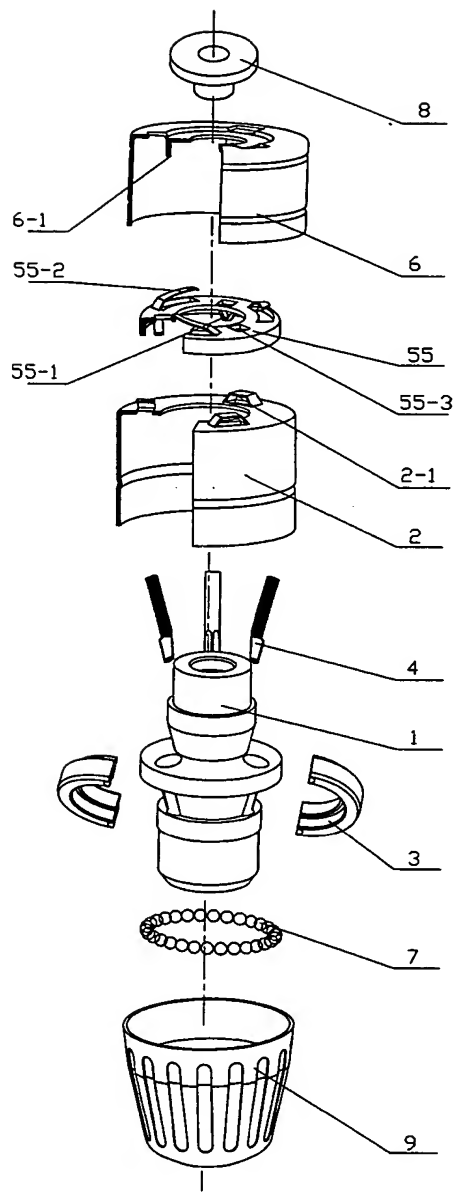


Fig. 6

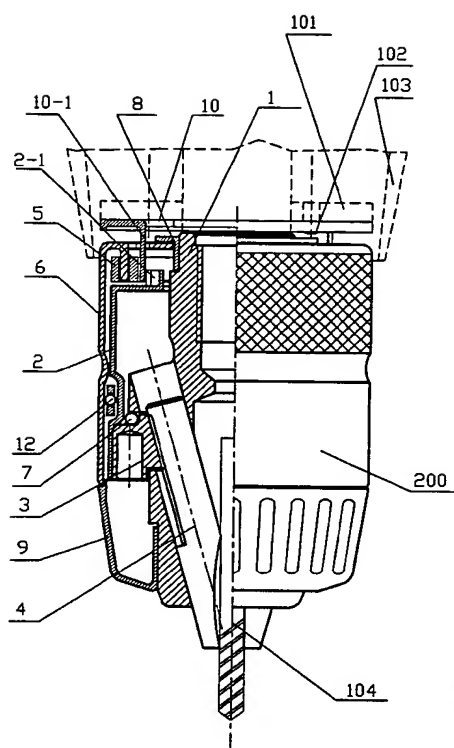


Fig. 7

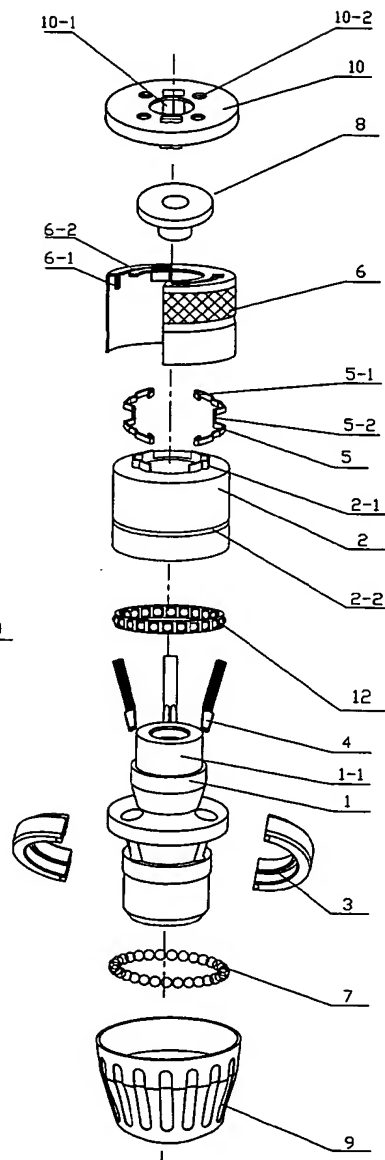


Fig. 8

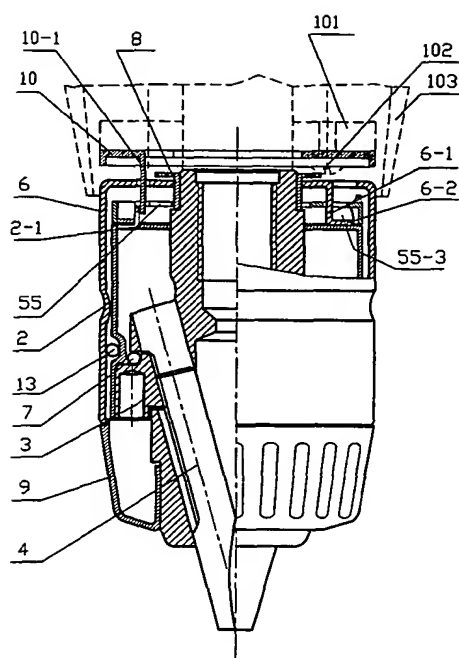


Fig. 9

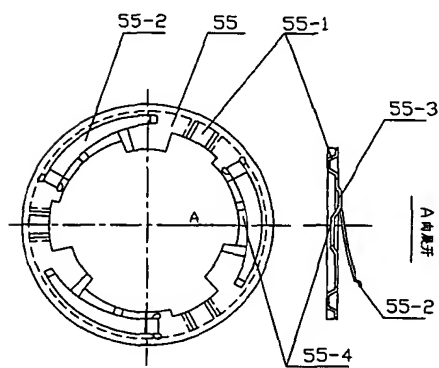


Fig. 10

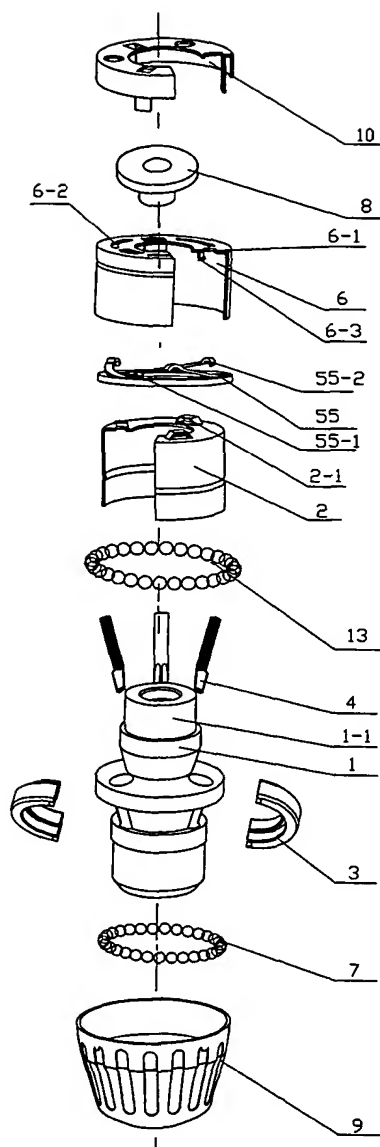


Fig. 11

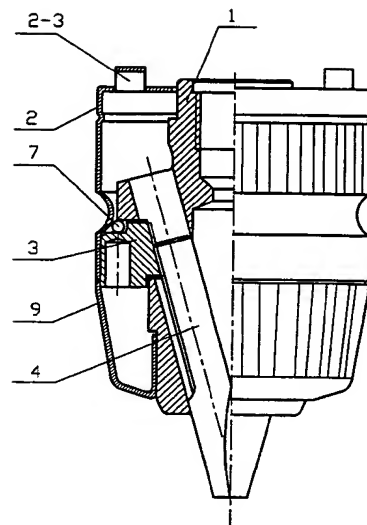


Fig. 12

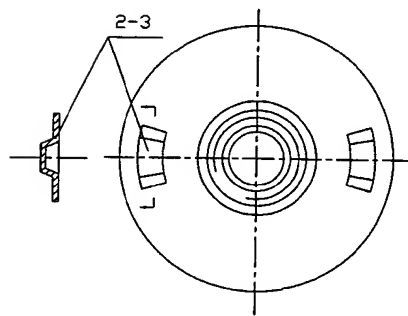


Fig. 13

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/CN03/00802

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B25B 31/12 51/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B25B 31/+ 45/+ 51/+

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Chinese Invention 1985-2003, Chinese Utility Models 1985-2003

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI EPODOC CNPAT PAJ: drill chuck key elastic flexible project 钻头 键 突 弹性

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN,Y,2414864 (QUANBAO Industry Limited Company) 17. Jan 2001(17.01.01) see the whole document	1
A	CN,Y,2376354 (QUANBAO Industry Limited Company) 3. May 2000(03.05.00) see the whole document	1
A	CN,Y,2576385 (TAIZHOU CHAOLI Machine-Electrical Inc.) 01. Oct 2003(01.10.03) see the whole document	1
A	US,A,6196554 (Power Holders Incorporated ) 06. Mar 2001(06.03.01) see the whole document	1

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search  
15. Nov 2003 (15.11.03)

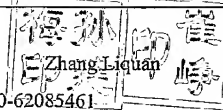
Date of mailing of the international search report

22 · JAN 2004 (22 · 01 · 2004)

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.

PCT/CN03/00802

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN2414864Y	17-01-01	None	
CN2376354Y	03-05-00	None	
CN2576385Y	01-10-03	None	
US6196554A	06-03-01	WO0035619A	22-06-00
		AU200031207	03-07-00
		TW415862	21-12-00
		GB2360963	10-10-01
		DE19983812	10-01-02

PUB-NO: EP001559491A1  
DOCUMENT-IDENTIFIER: EP 1559491 A1  
TITLE: A POWER DRILL CHUCK  
PUBN-DATE: August 3, 2005

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APPL-NO: EP03753220

APPL-DATE: September 22, 2003

PRIORITY-DATA: CN02135490A (September 20,  
2002)

INT-CL (IPC): B23B031/12 , B23B051/02

EUR-CL (EPC): B23B031/12